

5. Calibration/Validation

- FTA requirements for New Starts
- Implications
- Thoughts on good practice
- Three examples

FTA Requirements

- New Starts forecasts must be prepared with models tested against data on current transit ridership patterns
- New Starts forecasts must be a useful basis for quantifying and understanding the benefits of proposed projects

Implications

- More (and better) ridership data
- Need for clearer focus on transit markets
- Need for better tests and standards

Implications: Data

- Absence of data – a problem fixed
- Need to seize the opportunities
 - Data for testing prior to PE request
 - Data collected in Before-After studies
- Design of data collection activities
 - Scope, sampling plan, and expansion
 - Survey methods and data items/questions

Implications: Focus

- Matching target totals is *insufficient!!*
- Key markets, defined by:
 - Trip purpose
 - Socio-economic class
 - Production and attraction locations
 - Transit access mode
- More effective transit calibration:
"Do our models grasp adequately the characteristics of our key transit ridership markets?"

Implications: Tests

- Model calibration – a revised definition
 - Adjustments to match current patterns
 - Models in standard application context
 - Emphasis on important transit markets
 - Adjustments based on behavior, not arithmetic
 - Documentation
 - Key transit markets – fully characterized
 - Current transit modes – precisely defined
 - Calibration forecast – carefully examined

Implications: Tests

- Model validation – a revised definition
 - Valid (plausible) description of behavior
 - Valid (plausible) basis for discussion of current conditions
 - Valid (plausible) forecasts of deltas

Thoughts on Good Practice

- Allocation of resources
- Useful model-estimation topics
- Some specific tests

Allocation of Resources

■ Tradition

- Model development = parameter estimation
- Calibration = K estimation
- Validation = first/only real application

■ Traditional outcome

- Most resources go to estimation
- Left-over resources go to testing
- Little real testing before roll-out

Allocation of Resources

- “Better” allocation
 - Estimate models only where necessary
 - Fully fund (and protect) model testing
 - Recognize benefits of real model testing
 - More transparent behavioral focus
 - Models ready for application
 - Models already supportive of real-world insights

Useful Estimation Topics

- Workplace/destination choice
 - Recognition of long-term choices/timing
 - Choice-set formation
 - Performance of multimodal impedances
 - Reason for distance correction term

Useful Estimation Topics

- Mode choice
 - Choice-set formation
 - Parking supply characteristics
 - Additional transit attributes
 - Non-linearity in variables
 - Tour-based framework rather than trip-based framework (verification of this??)
 - Not: version #79 of the same specification!

Some Specific Tests

■ Calibration

- Assignment of on-board survey trips
- Identification of calibration markets
- P&A locations of transit riders, by market
- Access modes to stations for P's; for A's

■ Validation

- Full 2030 forecast → deltas vs. today
- Full “build” forecast → deltas vs. 2030 base

Three Examples of Careful Calibration Work

- Network design/testing with APC data
 - Dick Walker, Portland Metro
- Pathbuilder calibration with rider data
 - Bill Woodford, AECOM Consult
- Mode choice calibration with rider data
 - Bill Davidson, PB

Network Design/Testing with APC Data

Dick Walker
Scott Higgins
Aaron Breakstone

Portland Metro

Automatic Passenger Counters

- Registers boardings and alightings when infrared beam is interrupted
- Provides transit boardings and alightings by direction, by line, by stop, by time of day
- Program started with selected lines – now whole system

APC Applications

- Useful for count information
- Provides clues for demand model refinement and network design

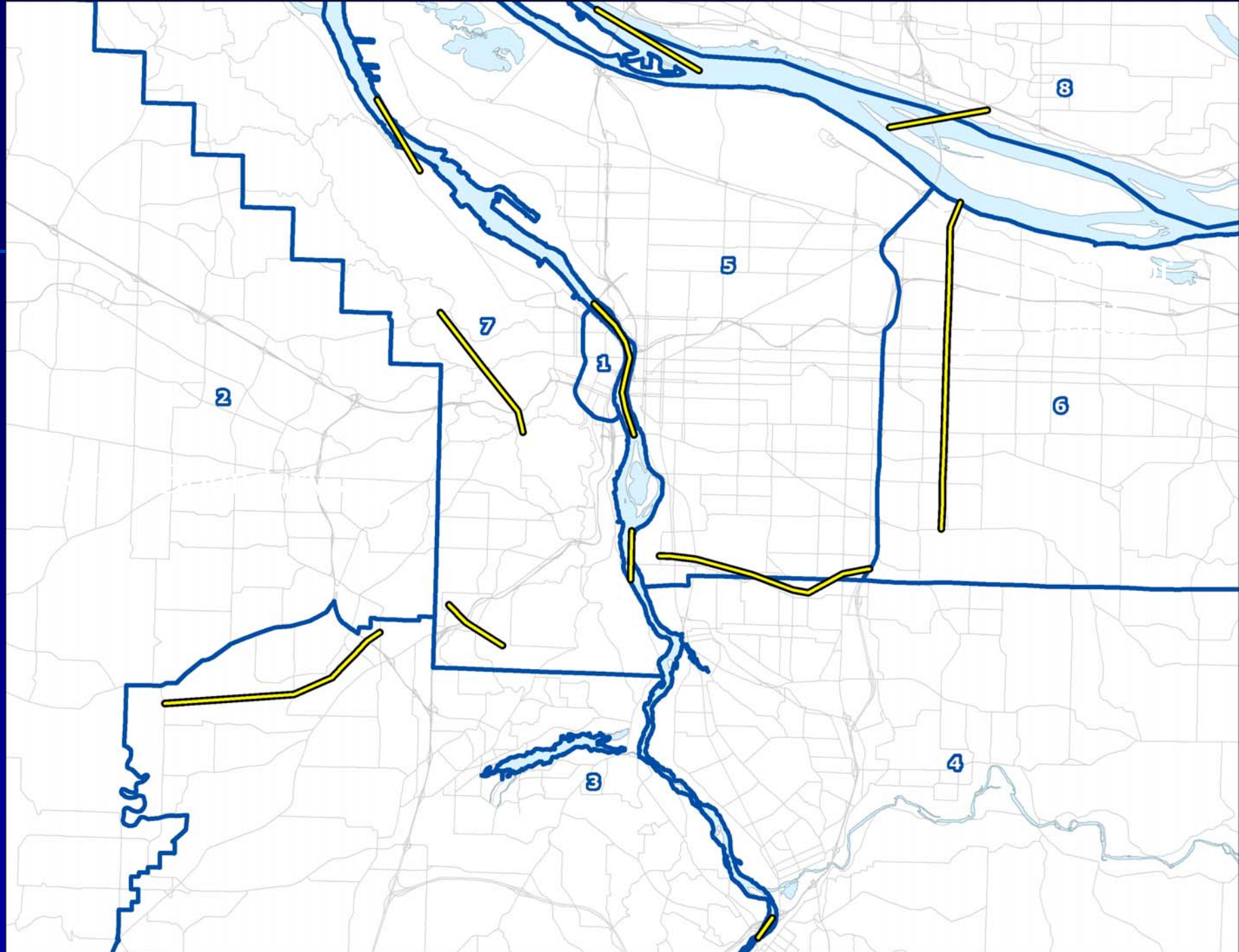
How Does Metro Use APC?

- Cutlines
- Line flow analysis
- Zonal analysis
- Walk accessibility to transit

Cutline Analysis

- Measure corridor flow
- Model vs. APC – macroscopic and mesoscopic indicator

Example follows →



Line Flow Analysis

- Flow levels by line segment
- Model vs. APC – microscopic indicator

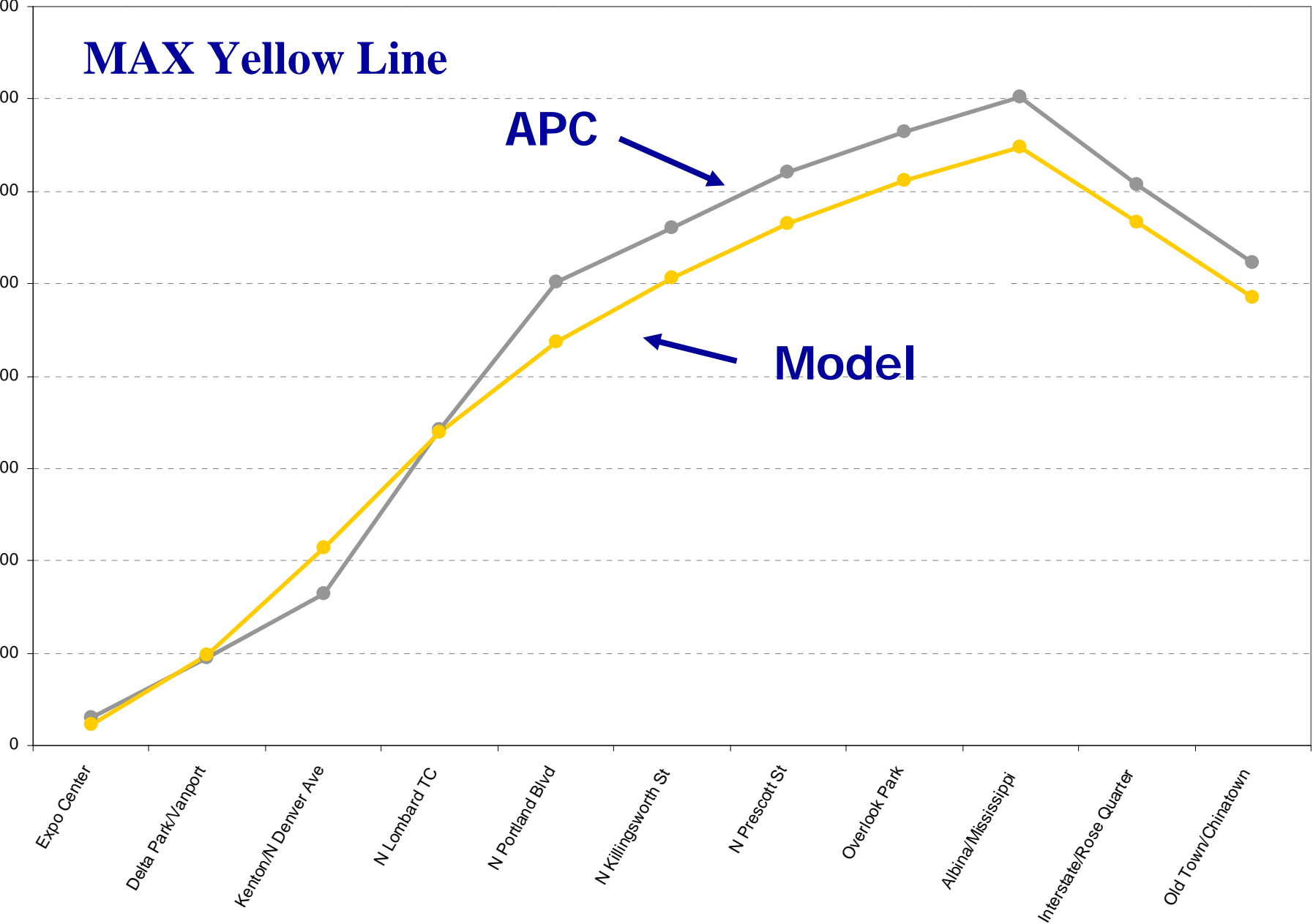
Example follows →

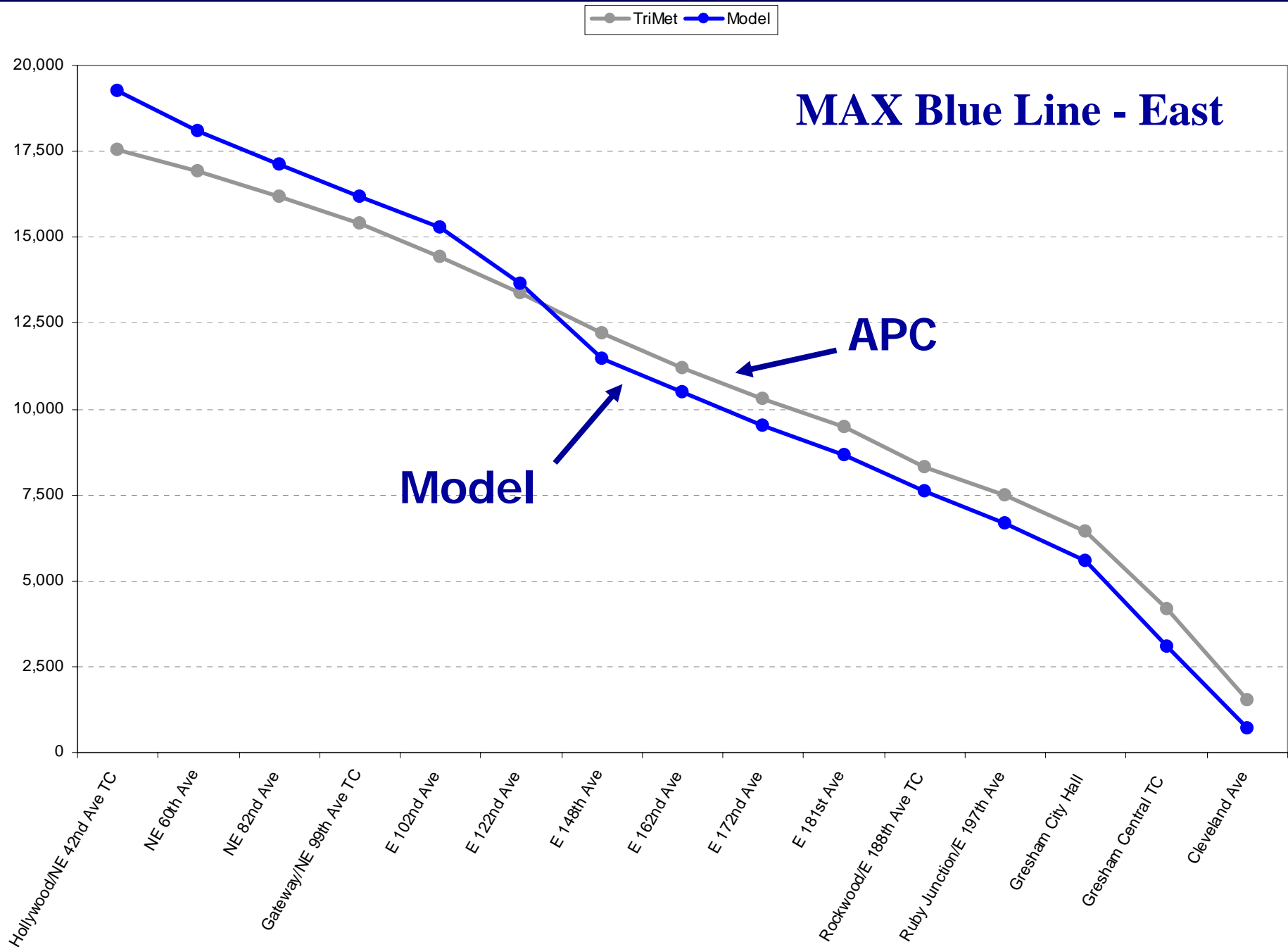
MAX Yellow Line

TriMet Model

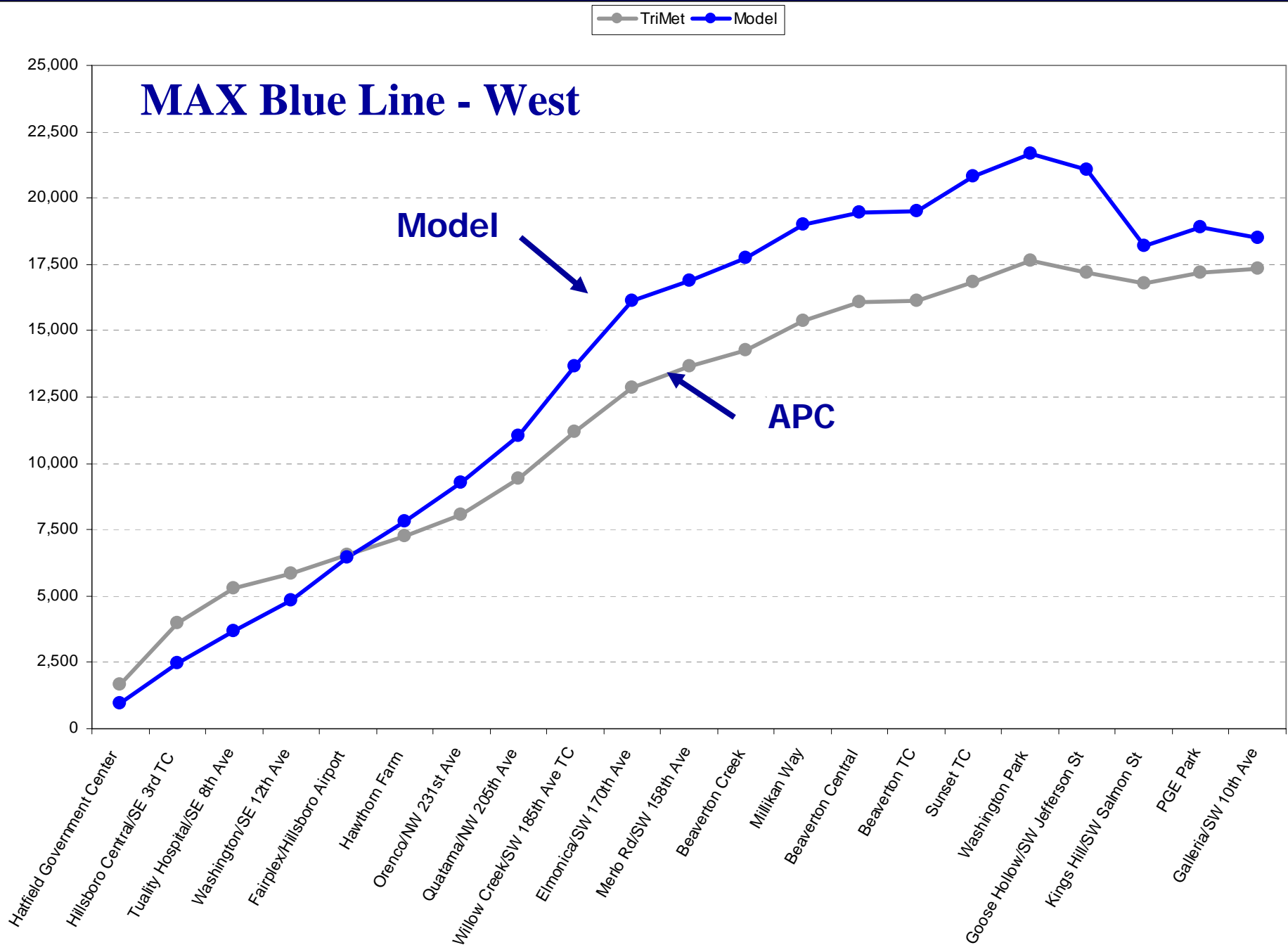
APC

Model





MAX Blue Line - West





LRT Station

Zone

0.58 mi.

0.20 mi.

0.31 mi.

0.17 mi.

0.35 mi.

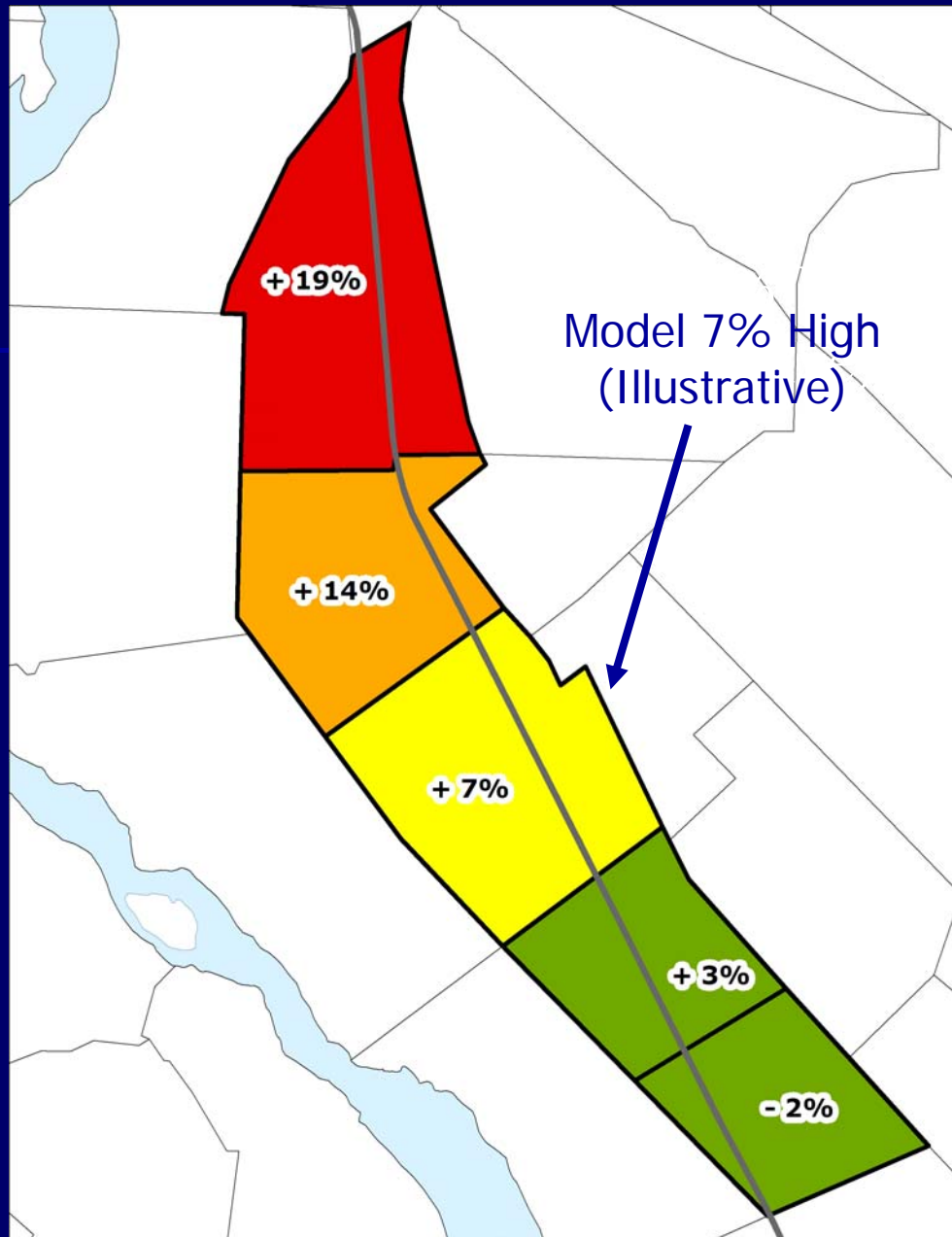
0.64 mi.

0.41 mi.

Zonal Analysis

- Patronage by zones
- Model vs. APC – microscopic indicator

Example follows →



Walk Accessibility

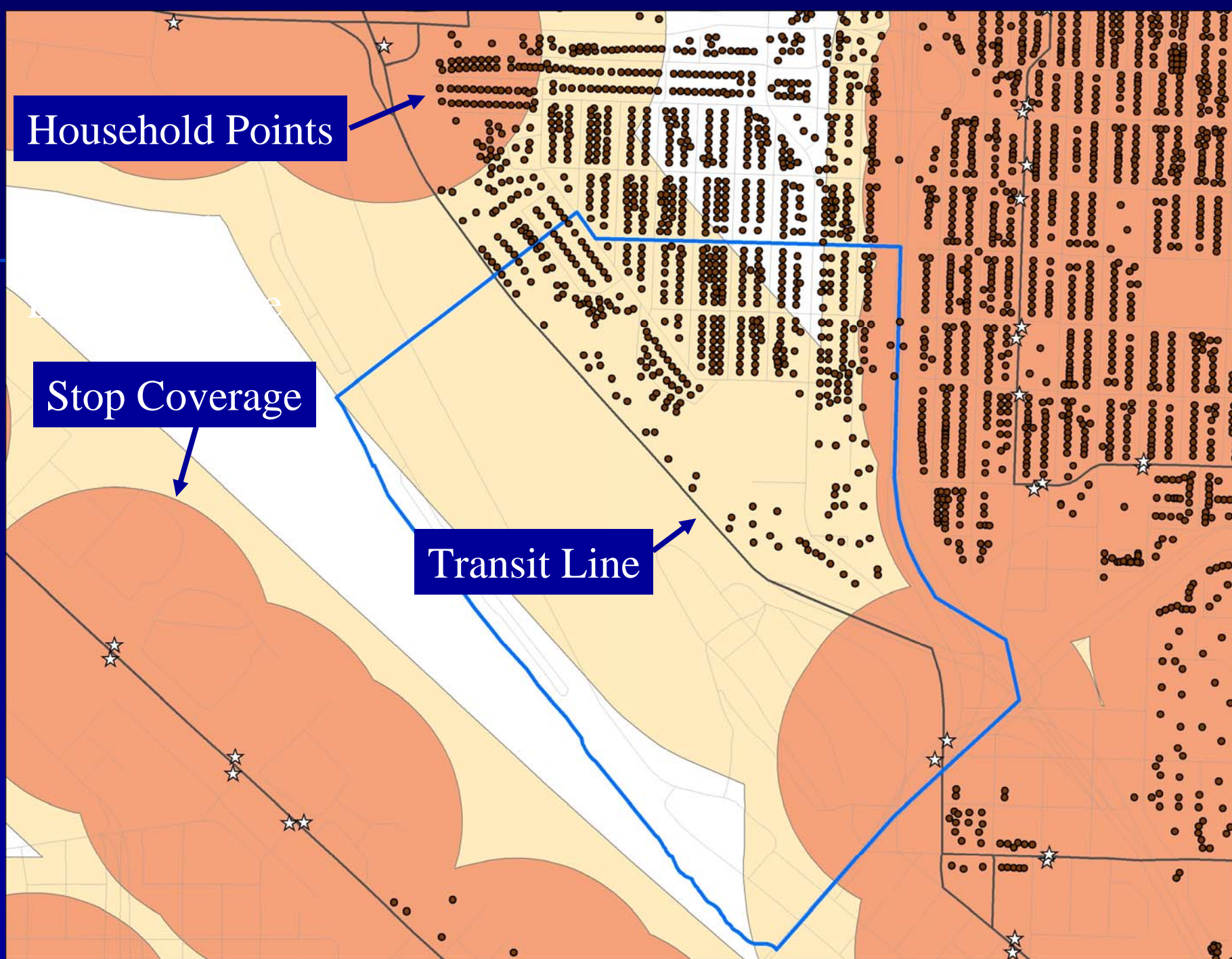
- Percentage of households and percent of employment in a zone that are walk accessible to transit
- Model vs. APC - microscopic indicator

Example follows →

Household Points

Stop Coverage

Transit Line



Other Considerations

- APC can point to other areas where the analyst may want to investigate
 - Land use allocation to zones
 - Transit vehicle speeds

Closing

- APC data useful at macro, meso, and microscopic levels.
- APC can help in model validation and network design
- Butcounts are not the whole story. Origin-destination patterns and trip purposes are not addressed.